GRAIN INSPECTION HANDBOOK

BOOK II, CHAPTER 1

GENERAL INFORMATION

CHAPTER 1

GENERAL INFORMATION

1.1 STANDARD ABBREVIATIONS

Admixture	adm	Erucic acid	erc
Amber Durum wheat	adu	Extra heavy	ehvy
Animal Filth	anfl	Fine foreign material	fine
Angoumois moths	moth	Flaxseed	flax
Badly stained	bads	Flint	flin
Badly weathered	badw	Frost-damaged kernels	fdk
Barley	bly	Flint and Dent	flad
Bird excreta	brdx	Foreign material	fm
Bleached	blch	Foreign material other than rye	fmor
Blight	blit	Foreign material other than wheat	fmow
Blue aleurone	blal	Foreign material other than wheat or rye	fmwr
Blue barley	blb	Garlic bulblets	garb
Blue Malting barley	blmb	Garlicky	gar
Bottom not sampled	bns	Glucosinolates	gluc
Bright	brit	Grain	gr
Broken corn	bc	Handpicked	hp
Broken corn and foreign material	bcfm	Handpicked foreign material	hpfm
Broken glass	glas	Hard Amber Durum wheat	hadu
Broken kernels	bn	Hard kernels	hard
Broken kernels and foreign material	bnfm	Hard Red Spring wheat	hrs
Canola	k	Hard Red Winter wheat	hrw
Castor beans	cstb	Hard and Vitreous Kernels of Amber Color	hvac
Choice	ch	Hard White wheat	hdwh
Class	cl	Heat-damaged kernels	ht
Coarse	crse	Heating	htg
Cockleburs	cbur	Heavy	hvy
Commercially objectionable foreign odor	cofo	Inconspicuous admixture	iadm
Contrasting classes	ccl	Insect-damaged kernels	idk
Conspicuous admixture	cadm	Infested	inf
Contrasting lentils	clen	Injured-by-frost	ibf
Corn	c	Injured-by-heat	ibht
Crotalaria	crot	Injured-by-mold	ibm
Cultivated sunflower seed	csf	Injured-by-sprout	ibs
Damaged kernels	dk	Large stones, etc.	lgst
Damaged kernels (total)	dkt	Light garlicky	lgar
Damaged seeds (total)	dst	Light smutty	lsm
Dark, Hard, and Vitreous	dhv	Limed	lime
Dark Northern Spring wheat	dns	Machine separated broken kernels and foreign material	msfm
Defects (total)	def		
Dehulled	dh	Malting barley	mb
Dent	dent	Materially weathered	mwth
Diatomaceous earth	diat	Mechanically separated dockage	mdkg
Distinctly discolored	disc	Mixed	x
Distinctly green kernels	dgk	Mixed corn	xc
Distinctly low quality	dlq	Mixed grain	xgr
Dockage	dkg	Mixed sorghum	xs
Durum wheat	du	Mixed soybeans	xsb
Dyed	dyed	Mixed wheat	xwht
Ergoty	erg	Moisture	m

Mold-damaged kernels	mdk	Soybeans	sb
Musty	must	Soybeans of other colors	sboc
Northern Spring wheat	ns	Splits	spl
Not standardized grain	nsg	Stained	stnd
Oats	o	Stinkbug damaged	skd
Odor	odor	Stones	ston
Oil	oil	Stress cracks	sc
Other classes	ocl	Subclass	scl
Other colors	ocol	Suitable malting type	smt
Other damaged kernels	odk	Sulfured	sulf
Other grains	og	Sunflower seed	sf
Other live insects injurious to stored grain	oli	Tannin sorghum	tans
Other types	ot	Test weight	tw
Other White wheat	owh	Thin	thin
Plump	pl	Total other material	tom
Protein	prot	Treated	tret
Purple mottled or stained	pms	Triticale	trit
Red Spring wheat	rs	Two-rowed barley	trb
Rodent excreta	rodx	Two-rowed malting barley	trmb
Rye	rye	Unclassed wheat	uncl
Sample grade	sg	Unknown foreign substance	fsub
Sclerotinia	sct	Unsuitable malting type	umt
Scoured	scor	Washed	wash
Shrunken and broken kernels	shbn	Waxy	waxy
Similar seeds	ss	Weevils (live)	lw
Six-rowed barley	srb	Western White wheat	wwh
Six-rowed malting barley	srmb	Wheat	wht
Six-rowed blue malting barley	srbm	Wheat of other classes	wocl
Slightly weathered	slw	White aleurone	whal
Skinned and broken kernels	skbn	White Club wheat	whcb
Smut balls	sbal	White corn	whc
Smutty	smut	White sorghum	whs
Soft Red Winter wheat	srw	White wheat	ww
Soft White wheat	swh	Wild buckwheat	wb
Sorghum	s	Wild brome grass seed	wbg
Sound barley	sbly	Wild oats	wo
Sound oats	so	Yellow corn	yc
Sour	sour	Yellow soybeans	ysb

NOTE: Abbreviations may be expressed in upper or lower case

1.2 VISUAL GRADING AIDS

a. General. The visual grading aids system assists inspectors in making subjective grading decisions. This system consists of visual reference images (VRI) and interpretive line prints. Reference is made to visual grading aids throughout this book.

b. Visual Reference Images. The visual grading aids system represents the foundation for the national inspection system's subjective quality control program, providing an effective management tool for aligning inspectors and assisting them in making proper and consistent subjective grading decisions. The system consists of a series of commodity specific VRI and descriptive text which, with regular use, controls and diminishes the impact of ordinary perceptional differences. Reference to the VRI is made throughout this handbook.

c. Interpretive Line Prints. Interpretive line prints (ILP) are used as an aid in making subjective grade determinations on general appearance. A special sample box is used to compare the grain being graded with the ILP. To compare the sample with the ILP, place the 5 x 7-inch photographic print in one side of the box and the grain in the opposite side. This allows for the comparison of the grain and the ILP under similar conditions. On the reverse side of each print is an explanation of the condition illustrated on the photograph and procedures for use of the photograph and box. ILS and ILP are available for viewing at FGIS field offices.

The Seedburo Equipment Company is responsible for the production and distribution of ILS, ILP, Slide Viewers, and Interpretive Line Slide Test Strips. Direct all correspondence and orders concerning these items to:

Seedburo Equipment Company
1022 W. Jackson Boulevard
Chicago, IL 60607
Telephone: (Business) - (312) 738-3700
(Orders) - 1-800-284-5779

d. Miscellaneous Aids. Inspectors may use a magnifying glass or similar device for visual identification of small objects.

VISUAL REFERENCE IMAGES

BARLEY

B-1.0	Blight damage
B-1.1	Mold damage
B-3.0	Injured-by-frost
B-3.1	Frost damage
B-4.0	Germ damage (discolored and/or mold)
B-5.0	Injured-by-heat
B-5.1	Heat damage
B-6.0	Weevil or insect bored
B-7.0	Injured-by-mold
B-8.0	Sprout damage
(B) OF-2.1	Skinned and broken
(B) OF-2.3	(A) Two-rowed, (B) Six-rowed
(B) OF-2.4	Injured-by-sprout

CANOLA

Canola-1.0	Distinctly green
Canola-2.0	Heat damage
Canola-3.0	Other damage (A)Rimed, (B) (Frost)
Canola-4.0	Sprout damage (A) Damage, (B) Not damage

CORN

C-1.0	Blue-eye mold
C-1.1	Purple plumule
C-2.0	Cob rot
C-3.0	Drier damage
C-4.0	Germ damage
C-4.2	Not germ damage
C-5.0	Heat damage (Drier)
C-5.1	Heat damage (White)
C-5.2	Heat damage (Yellow)
C-6.0	Insect damage
C-7.0	Mold damage
C-7.1	Not damage (Dirt)
C-7.2	Mold damage (Pink Epicoccum)
C-8.0	Silk cut
C-9.0	Sprout damage
C-10.0	Surface mold (Blight)
C-11.0	Surface mold (More than slight)
(C) OF-7.1	Mixed Corn (More than slight tinge-straw)
(C) OF-7.2	Mixed Corn (White-capped Yellow Corn)
(C) OF-7.3	Flint and Dent corn
(C) OF-7.4	Sweet corn and popcorn (BCFM)
(C) OF-7.5	Corn of other colors
(C) OF-7.7	Mixed corn (More than slight tinge-pink)
(C) OF-7.71	Mixed corn (Purple pigmented corn)
(C) OF-7.8	Slightly yellow in (White waxy) corn
(C) OF-7.9	Yellow and White corn (Waxy)
(C) OF-7.91	Yellow and White corn (Non waxy)

FLAXSEED

F-1.0	Damaged Flaxseed (Bee's wings)
F-2.0	Damaged-by-heat
F-3.0	Heat damage

OATS

O-1.0	Badly ground and/or weather damage
O-1.1	Weather damaged (Stained)
O-2.0	Germ Damage (Sick and/or mold)
O-2.1	Mold damage
O-3.0	Heat damage
O-4.0	Insect damage
O-5.0	Sprout damage

RYE

RY-1.0	Germ damage (Sick and/or mold)
RY-3.0	Sprout damage
RY-3.1	Exposed germ in sound rye (not sprout)
RY-3.2	(A) Insect chewed, (B) Sprout sockets
RY-4.0	Weevil or insect bored
RY-5.0	Other damage

SORGHUM

S-1.1	Germ Damage (Bleach method)
S-2.0	Ground and/or weather damage
S-3.0	Heat damage
S-4.0	Insect bored damage
S-5.0	Mold damage
S-5.1	Mold damage (Internal mold)
S-6.0	Sprout damage
S-7.0	Split germ (Sound kernels)
S-8.0	Purple pigment damage
S-9.0	Tannin sorghum (Bleached)
(S) OF-16.0	Non-grain sorghum
(S) OF-33.0	White sorghum

SOYBEANS

SB-1.0	Badly ground and/or weather damage
SB-1.1	Weather damage (Gray/black)
SB-2.0	Damaged by heat
SB-3.0	Green damage
SB-3.2	Frost damage (Waxy)
SB-5.0	Heat damage (Materially damaged/heating)
SB-6.0	Immature (Wafer)
SB-7.0	Insect bored kernels
SB-8.0	Mold damage
SB-8.1	Mold damage (Pink)
SB-9.0	Sprout damage
SB-10.0	Stinkbug or insect stung kernels
SB-12.0	Soybeans of other colors
SB-13.0	Shriveled and wrinkled

VISUAL REFERENCE IMAGES

SUNFLOWER SEED	
SS-1.0	Damaged-by-heat
SS-2.0	Heat damage
SS-3.0	Surface mold
WHEAT	
W-1.0	Black tip damage (Fungus)
W-2.0	Scab damage
W-3.0	Frost damage (Blistered)
W-3.1	Frost damage (Candied)
W-3.2	Frost damage (Discolored black or brown)
W-3.3	Frost damage (Flaked)
W-4.0	Germ damage
W-4.1	Mold damage
W-4.2	Germ damage (Bleach method)
W-5.0	Green damage (Immature)
W-6.0	Heat damage (Durum)
W-6.1	Heat damage (Other than durum)
W-7.0	Other damage (Mold)
W-8.0	Sprout damage
W-8.1	(A) Insect chewed, (B) Sprout sockets
W-9.0	Weevil or insect bored
W-9.1	Insect chewed wheat (Not damaged)
(W) OF-17.0	Unknown foreign substance (Pink wheat)
(W) OF-23.0	Smut in wheat (Tagged ends)
(W) OF-30.0	Threshed and unthreshed kernels

OTHER FACTORS	
OF-1.0	Animal filth
OF-2.2	Wild brome grass seeds
OF-3.0	Castor beans
OF-4.0	Chess
OF-5.0	Cob joints
OF-6.0	Cocklebur, Yellow star thistle, star/sand bur
OF-8.0	Crotalaria seeds
OF-8.1	Velvet leaf seeds
OF-9.0	Cultivated buckwheat
OF-10.0	Einkorn
OF-11.0	Emmer
OF-12.0	Ergot
OF-13.0	Green garlic bulblets (Whole)
OF-13.1	Dry garlic bulblets (⅓)
OF-14.0	Guar
OF-15.0	Hull-less barley
OF-18.0	Polish wheat
OF-19.0	Poulard wheat
OF-20.0	Rice types
OF-21.0	Safflower seed
OF-22.0	Smut balls
OF-24.0	Spelt
OF-25.0	Sunflower seed
OF-26.0	Triticale
OF-27.0	Wild buckwheat and similar seeds
OF-28.0	Wild oats
OF-31.0	Suspected fertilizer (FSUB)
OF-32.0	Sclerotia
OF-34.0	Cotton seed
OF-35.0	Malted barley

INTERPRETIVE LINE PRINTS

Soybeans	Mottled or stained by pokeberry stain
	Mottled or stained by the growth of a fungus
	Mottled or stained by dirt or dirt-like substance
Sorghum	Badly weathered (sorghum/tannin and white appearance mixed)
	Badly weathered (sorghum or tannin appearance)
	Badly weathered (white appearance)
	Distinctly discolored (sorghum/tannin and white appearance mixed)
	Distinctly discolored (sorghum or tannin appearance)
	Distinctly discolored (white appearance)
Oats	Materially weathered
	Slightly weathered
Hard White Wheat	Hard White wheat color line

1.3 WORK RECORDS

FGIS personnel shall use Forms FGIS-920, "Grain Sample Ticket," FGIS-918, "Sample Pan Ticket," FGIS-919, "Sampling Ticket," or FGIS-921, "Inspection Log," to record all sampling and inspection information.

Agency personnel shall use similar work forms to record all sampling and inspection information.

1.4 PRELIMINARY EXAMINATIONS

Inspection personnel sampling grain must: (1) observe the uniformity of the grain as to kind, quality, and condition; (2) draw an original sample; and (3) report the results to the inspector.

The inspector must consider the sampler's observations when determining the representativeness of the sample. If the inspector suspects the sample is not representative, the inspector should consult with the sampler and, if necessary, dismiss the inspection or arrange to obtain another sample.

1.5 DEFINITIONS

a. File Sample. A representative portion of an official sample (approximately 1,400 grams or more).

b. Identity (Kind of Grain). A determination as to whether a sample meets the definition of a specific grain or oilseed as established in the Official U.S. Standards for Grain.

c. Representative Portion. A part or limited quantity of grain separated from the original sample by means of an approved device.

d. Representative Sample. The terms "Representative Sample" and "Original Sample" are used interchangeably in the Grain Inspection Handbook and refer to a sample of approximately 2,800 grams in size drawn from a grain lot by official inspection personnel using approved procedures and sampling devices. See Book I, Sampling, for further information on sampling.

e. Work Sample. A representative portion of grain of sufficient size (approximately 1,000 - 1,050 grams) to make determinations required for a particular grain.

f. Review Inspection. A reinspection, appeal inspection, or Board appeal inspection service.

1.6 BASIS OF DETERMINATION

Each chapter in Grain Inspection Handbook, Book II, provides a definition for basis of determination which establishes the rules for testing/analyzing all factors. Do not analyze any factor until the basis for making the determination is known.

1.7 SUBMITTED SAMPLE INSPECTIONS

According to section 800.80(a)(4) of the regulations under the United States Grain Standards Act, "A submitted sample inspection service shall be based on a submitted sample of sufficient size to enable official personnel to perform a complete analysis for grade. If a complete analysis for grade cannot be performed because of an inadequate sample size or other conditions, the request for service shall be dismissed or a factor only inspection may be performed upon request." For the purpose of providing a complete inspection, due to the requirement that the test weight of the grain be shown on each certificate for grade, "sufficient size" is defined as being of sufficient quantity to overflow the test weight kettle (minimum). Samples containing less than this amount shall be limited to factor(s) only inspection.

The amount of sample required to be submitted for a factor(s) only inspection depends on the factor(s) information being requested. Certain objective factors/official criteria (e.g., moisture and protein/oil content) require specific quantities of grain in order for the equipment used in the determination to function properly. Whenever the amount of grain used in these determinations deviates from the prescribed amount, the accuracy of the determination is sacrificed. Consequently, inspection requests for samples containing less than these specified amounts must be dismissed.

For factors not dependent on equipment requiring specific portion sizes, the amount of sample submitted for factor only inspections may vary since the inspection results only represent the amount of grain submitted. The analysis of a submitted sample for subjective factors (e.g., damage and foreign material) or other objective factors (e.g., dockage and shrunken and broken kernels) is not compromised through the use of portion sizes which are less than those specified in individual chapters of this handbook. Consequently, unless restricted by equipment performance requirements, factor only inspection requests may be performed on submitted samples which contain less grain than the portion size prescribed in this handbook.

1.8 DISCLAIMER CLAUSE

The mention of firm names or trade products does not imply that they are endorsed or recommended by the United States Department of Agriculture over other firms or similar approved products not mentioned.

1.9 BOERNER DIVIDER

The Boerner divider reduces the size of a grain sample while maintaining the representativeness of the original sample. Use the Boerner divider, or a divider that gives equivalent results, when reducing a sample to the portion size required for a specific test/analysis.

a. General Operating Procedures.

(1) Check the divider for condition and cleanliness.

(2) Close the hopper valve.

(3) Place empty collection pans under the discharge spouts.

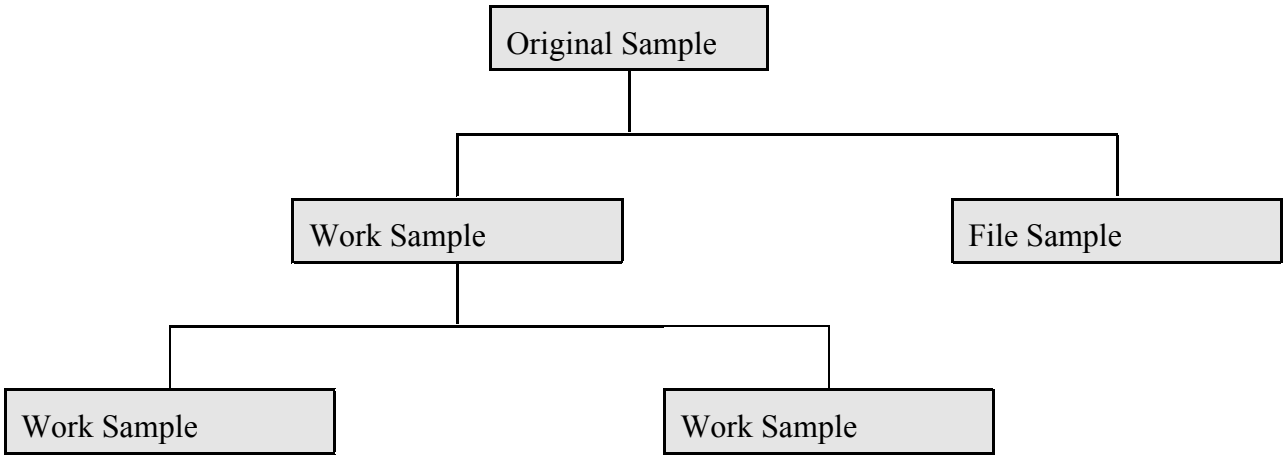
(4) Pour the sample into the hopper.

(5) Open the valve quickly. For large samples, feed more grain into the hopper during the dividing process.

For more specific information on the operation, maintenance, and performance testing of Boerner dividers, see chapter 7 of the Equipment Handbook.

b. Processing the Original Sample. Use the Boerner divider to subdivide the original sample into a file sample and appropriate work samples.

Chart - Processing Original Sample



c. Processing the Work Sample. Refer to the individual grain chapters for specific information on processing the work sample.

1.10 GAC 2100 MOISTURE METER

The DICKEY-john Grain Analysis Computer GAC 2100 is the designated official moisture meter for performing moisture analysis in grains.

a. Environmental Conditions. Ensure that the moisture meter is placed in a room that is within the manufacturer's basic requirements of 10-40° C (50-104° F). To minimize the effects of instrument temperature in official inspection, it is recommended that the laboratory temperature for the GAC 2100 be maintained within the range of 15-30° C (approx. 60-85° F).

b. Instrument Temperature. The built-in GAC 2100 instrument temperature range limit is 10-40° C (50-104° F). If the instrument temperature is determined to be outside the range of 10-40° C, no moisture results will be displayed.

c. Sample Temperature. The built-in GAC 2100 sample temperature range limit is 0-40° C (32-104° F). If the instrument's measured sample temperature is outside the range of 0-40° C, no moisture results will be displayed. For optimum accuracy and consistency in official inspection, it is recommended that the sample temperature be brought within the range of 10-32° C (50-90° F) before performing moisture determinations.

d. Sample-Instrument Temperature Difference. The built-in GAC 2100 sample-to-instrument temperature difference limit is 20° C (36° F). If the instrument finds the sample temperature to be different from the instrument temperature by more than 20° C, it will not display moisture results. For optimum accuracy and consistency in official inspection, it is recommended that the difference between the grain and instrument temperature not exceed 11° C (20° F).

e. Analytical Portion Size. The GAC 2100 does not require weighing a portion size. A representative portion size of approximately 225 grams is required for moisture testing purposes for oats and sunflower seed. For all other grains a portion of approximately 350 grams is required.

f. Type of Container. Keep all samples in sealed moisture-proof containers if they can not be tested within approximately 15 minutes. Do not use paper bags, fiber cartons, etc., as containers for moisture samples because they tend to draw moisture from the sample.

Containers found to be most practical for retaining moisture are plastic, 1-pint containers. **CAUTION**: Do not place paper **into** moisture samples because paper absorbs moisture and lowers the moisture of the grain.

g. Recording Results. The GAC 2100 does not require manual calculations or the reading of charts, therefore eliminating the use of a moisture log. Official personnel will maintain a work record on the pan ticket and certificate.

h. General Operating Procedures.

(1) Pour the sample through the divider at least once (to mix the sample) before filling the hopper.

(2) Select the appropriate grain from the menu.

(3) Fill the sample hopper located on top of the unit with enough grain to fill the measuring cell inside the instrument (heap grain slightly). The exact volume of grain is not important, except enough grain must be present to overfill the cell (approximately one pint). When the test begins, any excess grain spills over the cell and drops into the sample drawer. If the amount of grain is insufficient to overfill the test cell, depress UNLOAD to dump the sample and repeat the test with a sufficient sample size.

(4) Depress the LOAD key on the keyboard to start the test cycle.

(5) Wait briefly for the moisture test to finish.

(6) Observe the results of the test on the display and record the results on the work record.

(7) When finished with the measurement, depress the UNLOAD key.

NOTE: The GAC 2100 is equipped to report moisture outside the approved range for the calibration. An error indication will notify the operator if the calibration range is exceeded. When the moisture reading exceeds the approved calibration range, another determination shall be made from the work sample or file. If the second determination is not outside the approved calibration range, use the second moisture result. Otherwise, the final moisture shall be based on the average of the two determinations and rounded to the nearest 0.1 percent moisture.

(8) For additional instructions, refer to the GAC 2100 operator's manual.

1.11 TEST WEIGHT PER BUSHEL APPARATUS

Test weight per bushel is the weight per Winchester bushel (2,150.42 cubic inches) as determined using an approved device.

The determination for test weight is made on a portion of sufficient quantity to overflow the kettle. Before making a determination, refer to the chapter covering the grain being tested for the basis of determination and certification requirements.

General Operating Procedures:

a. Level and balance the test weight per bushel apparatus.

b. Close the hopper valve.

c. Pour the work sample into the hopper.

d. Center the hopper over the kettle.

e. Fill the kettle by opening the hopper valve quickly.

f. Move the hopper all the way to the left before proceeding. Do not jar the apparatus. Jarring could cause inaccurate results.

g. Using a standard stroker, stroke the kettle by holding the stroker in both hands with the flat sides in a vertical position. Level the grain in the kettle by making three full-length, zigzag motions with the stroker.

h. Convert the weight of the sample by either the "standard" method or one of the "alternate" methods.

(1) Standard Method. Carefully hang the kettle on the beam and move the weights until the beam is balanced. Read the test weight per bushel scale.

(2) Alternate Method - Manual Conversion. Pour the sample from the kettle onto a general class scale, note the weight of the sample, find the gram weight on the test weight conversion chart (see Appendix 1), and read the corresponding test weight per bushel shown to the right of the gram weight.

(3) Alternate Method - Automatic Conversion. When using an electronic scale programmed to convert gram weight to pounds per bushel select the appropriate test weight mode. Place an empty sample pan or the test weight kettle on the scale and zero the scale. Pour the sample from the kettle into the sample pan or place the filled kettle onto the scale as appropriate. Read the result from the test weight mode selected.

NOTE: While all grain samples may be weighed and converted to pounds per bushel (lb/bu) using these electronic programmed scales, DO NOT use these scales to convert gram weight to kilograms per hectoliter (kg/hl) for wheat, as they are only programmed using the 1.287 conversion factor referenced above.

i. Record the test weight per bushel on the work record and certificate as prescribed for the particular grain being tested. (Refer to the appropriate grain chapter in this handbook.) Upon request, convert the pounds per bushel to kilograms per hectoliter. Refer to the test weight per bushel/kilogram per hectoliter conversion table (see Appendix 2) or use the appropriate formula listed in Table No.1 below to determine kilograms per hectoliter. Record the results (to the nearest tenth kg/hl) in the "Remarks" section of the certificate.

TABLE NO. 1

TEST WEIGHT PER BUSHEL CONVERSIONS

From: Pounds Per Bushel (lb/bu)		To: Kilograms Per Hectoliter (kg/hl)	
Grain	Input*	Formula	Result
Durum Wheat	Pounds per bushel result	(lb/bu x 1.292) + 0.630	Kilograms per hectoliter
All other Wheat types	Pounds per bushel result	(lb/bu x 1.292) + 1.419	Kilograms per hectoliter
All other grains	Pounds per bushel result	lb/bu x 1.287	Kilograms per hectoliter

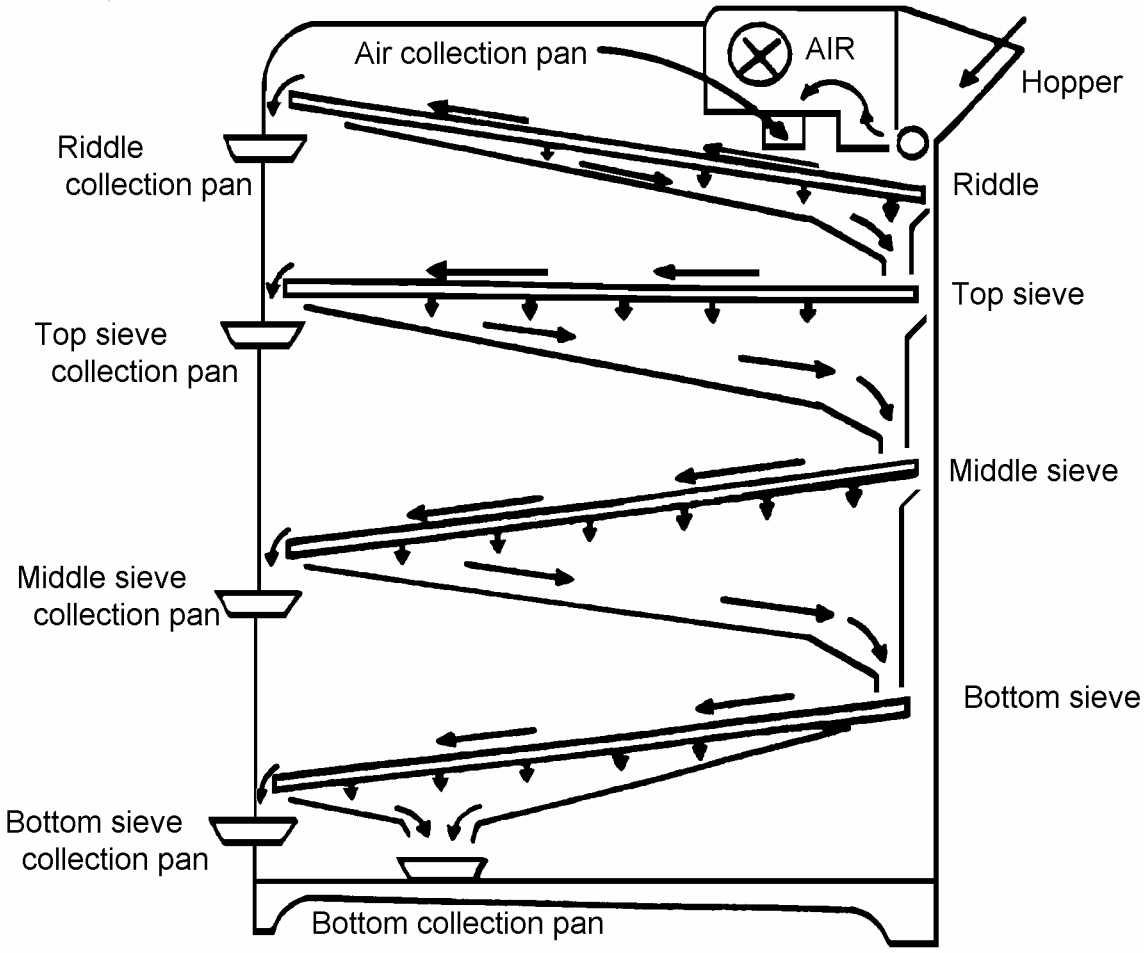
*** Use the appropriate test weight per bushel result (e.g., whole and half pound, whole and tenth pound)**

For more specific information on the operation, maintenance, and performance testing of the test weight per bushel apparatus, see chapter 5 of the Equipment Handbook.

1.12 CARTER DOCKAGE TESTER

The Carter dockage tester uses aspiration (air) and a combination of riddles and sieves to prepare samples for grading by removing the readily separable foreign matter. Generally, the foreign material removed consists of all matter lighter, larger, or smaller than grain.

CARTER DOCKAGE TESTER FLOW CHART



General Operating Procedures:

a. Set air and feed controls at the prescribed settings.

b. Place the riddle, if applicable, and sieve(s) in the prescribed locations.

Table No. 2 lists the proper riddles, sieves, air, and feed control settings to use for each type of grain.

TABLE NO. 2

EQUIPMENT SCHEDULE & CONTROL SETTINGS						
Type of Grain	Air	Feed	Riddle	Top Sieve	Middle Sieve	Bottom Sieve
Wheat other than Durum	4	6	2		2	2
Durum wheat	4	6	25		2	2
Rye	4	6	25		2	2
Corn	1	10*		3		
Barley	4	6	6	8	6	
Flaxseed	3 ½	4	000	4	2	7
Sorghum	1	6	6	6		1
Triticale	4	6	25		2	2
Sunflower Seed	6*	7 ½	Oil Seed (35898)	3		8
Canola	5	3	000	4		
* Setting may vary, refer to the Equipment handbook.						

Wheat, rye, triticale, and canola have additional testing procedures when they contain excessive quantities of wild buckwheat, cob joints, chess and similar types of seeds, and flaxseed. Refer to the appropriate chapters for the limits and specific instructions on how to set the Carter dockage tester when this material is found.

c. Check the air collection pan to see if it is empty and place the collection pans in the prescribed locations.

d. Turn the tester on.

e. Pour the work sample into the hopper.

f. When all of the grain has cleared the hopper, riddle (if applicable), and sieves, turn the tester off.

g. Collect all material separated by the aspirator, riddle (if used), and sieves. Combine the material as prescribed in the chapter covering the particular grain.

For more specific information on operation, maintenance, and performance testing procedures, see chapter 4 of the Equipment Handbook.

1.13 MECHANICAL SIEVE SHAKER

The grading of certain grains requires that some portions be sieved. This is accomplished either by (1) hand or (2) mechanical sieving. Mechanical sieving is preferred over the hand-sieving method because the results are more uniform and accurate in counting the number of strokes. The mechanical sieve shaker has a range of 1 to 120 strokes, always starting and stopping in the same position. One complete stroke should take approximately 1 second.

TABLE NO. 3

FACTORS THAT REQUIRE SIEVING				
Grain	Factor	Strokes	Manufacturers' Designation Sieve Size (Inches)	Metric Conversion Millimeters
Wheat	Shrunken and Broken Kernels	30	0.064 x 3/8 oblong *	1.63 x 9.53
Barley	Thin: Barley Thin: Six-rowed Malting Barley Thin: Two-rowed Malting Barley Plump	30 30 30 30	5/64 x 3/4 slot * 5/64 x 3/4 slot * 5.5/64 x 3/4 slot * 6/64 x 3/4 slot *	1.98 x 19.05 1.98 x 19.05 2.18 x 19.05 2.38 x 19.05
Rye	Thin and Plump	30	0.064 x 3/8 oblong *	1.63 x 9.53
Soybeans	Foreign Material	5	8/64 round	3.175
Triticale	Shrunken and Broken Kernels	30	0.064 x 3/8 oblong *	1.63 x 9.53
Oats	Thin	30	0.064 x 3/8 oblong *	1.63 x 9.53
Sunflower Seed	Admixture	See Chapter 11	5/64 inscribed circle	1.98
Canola	Dockage	30 30 30	0.028 x 15/32 oblong 0.035 x 15/32 oblong 0.0395 x 15/32 oblong	0.71 x 11.906 0.89 x 11.906 1.0 x 11.906
* Precision sieves, refer to Equipment Handbook				

General Operating Procedures:

a. Refer to the individual grain chapters for the basis of determination and portion size.

b. Make sure the shaker is level.

c. Select the proper sieve and place it over a bottom pan.

d. Mount the sieve and bottom pan in the sieve holder making sure that the slotted or oblong perforations are parallel with the sieving action.

e. Set the stroke counter for the required number of strokes.

f. Gently pour the representative portion of grain in the center of the sieve.

g. Turn the machine on.

h. After the required number of strokes has been completed, the machine will automatically stop.

i. Carefully remove the sieve and bottom pan. Jarring the sieve will cause the material remaining on top to pass through the perforations, leading to inaccurate results.

j. Combine the material lodged in the perforations with the material that remained on top of the sieve. To remove the lodged material from the perforations, rub the sieve bottom gently. Tapping will warp the sieve and lead to inaccurate results in future determinations.

For more specific information on the operation, maintenance, and performance testing of sieves and sieve shakers, see chapter 9 of the Equipment Handbook.

1.14 BARLEY PEARLER

The barley pearler dehulls barley and sunflower seed for certain factors. The machine uses a carborundum wheel controlled by a time switch. The wheel removes the hulls and a screen separates the hulls and powdered barley or sunflower seed hulls from the pearled barley or sunflower seed.

Barley pearlers are individually standardized by adjusting the length of time the barley remains in the pearling chamber while the wheel is in motion. Post the standardized pearling time conspicuously on each machine.

General Operating Procedures:

a. Before placing the portion into the pearler:

(1) Run the pearler and open the slide to ensure that the pearling chamber is empty.

(2) Remove and empty the drawers that catch the barley hulls and pearled portion. Replace them.

(3) Securely close the slide.

b. Pour the sample into the hopper and replace the lid.

c. Set the time for the grain being pearled.

d. After pearling, pull out the slide and allow the pearled portion to drop into the drawer. With the slide open, briefly restart the machine and clear the pearling chamber.

e. Proceed with the determination as described in the appropriate chapter of the handbook.

For more specific information on the operation, maintenance, and performance testing of barley pearlers, see chapter 8 of the Equipment Handbook.

1.15 LABORATORY SCALES

a. Weigh work portions and separations from work portions using an approved grain test scale with an appropriate division size as follows:

TABLE NO. 4

REQUIRED DIVISION SIZES			
Work Portion	Division Requirement		Accuracy Class
	e	d	
≤ 100 grams	e ≤ 0.1 gram	d ≤ 0.01 gram	II (expanded resolution)
> 100 grams	e ≤ 0.1 gram	d ≤ 0.1 gram	II, III
> 500 grams	e ≤ 1 gram	d ≤ 1 gram	II, III
d = The smallest scale division displayed. e = The size of the division used for accuracy test purposes. See Chapter 2 of the Equipment Handbook for additional information.			

b. Some expanded resolution scales have cross-hatching over the least significant digit on the display. The last digit is ignored when testing the scale, but should be used when weighing work portions or separations.

c. Choose the appropriate scale based on the work portion size. The work portion and the separation shall be weighed using a scale with the same (or better) maximum division size. For example:

(1) Weigh a work portion of 1,000 grams on a scale with e ≤ 1 gram d ≤ 1 gram. Weigh the separation on the same (or better) scale.

(2) Weigh a work portion of 250.4 grams on a scale with e ≤ 0.1 gram d ≤ 0.1 gram. Weigh the separation on the same (or better) scale.

(3) Weigh a work portion of 60.02 grams on a scale with e $\leq$ 0.1 gram d $\leq$ 0.01 gram (expanded resolution is acceptable). Weigh the separation on the same (or better) scale.

(4) Certain factors are sometimes certified to the nearest hundredth percent. Therefore, use a scale with e $\leq$ 0.1 gram d $\leq$ 0.01 gram (expanded resolution is acceptable).

(5) If you need assistance in determining if a scale is being used appropriately, or that it is configured with the correct division size, consult the Approved Equipment List or contact the Policies and Procedures Branch.

1.16 ROUNDING

When certificating official results, use the following procedures for rounding unless otherwise specified.

A hand-held calculator or computer may be used to calculate results and to provide rounding.

a. If the calculating device is programmable, set the device to the number of decimal places or whole number needed for reporting on the work record or certificate. Test the results to ensure that the rounding procedure is identical to the FGIS rounding method described in b. below. Otherwise, set the calculating device to the floating mode and carry the results one decimal place further than the level required and round the final results as in b. below.

b. When the figure to be rounded is followed by a figure greater than or equal to 5, round to the next higher figure; for example, report 6.35 as 6.4, 0.45 as 0.5, etc. When the figure to be rounded is followed by a figure less than 5, retain the figure; for example, report 8.34 as 8.3, 1.22 as 1.2, etc.

Record all the information on the certificate as shown in Table No. 5 - Certifying Percentages and Test Weight.

TABLE NO. 5

CERTIFYING PERCENTAGES AND TEST WEIGHT		
Factor	Grain	Certified to
Class	Barley	Nearest whole percent
Class and Subclass	Wheat	Nearest whole percent
Dockage	Flaxseed, and Sorghum Barley, Triticale Wheat, Rye	Whole percent, fraction disregarded Whole & half percent, fraction disregarded Nearest tenth percent
Ergot	All Grains	Nearest hundredth percent
Foreign material and/or foreign material & fines	Mixed grain Sunflower seed All other grains	Nearest whole percent Nearest whole & half percent **1/** Nearest tenth percent
Flint and Dent, Flint, & waxy	Corn	Nearest whole percent
Identity (kind of grain)	All grains	Nearest whole percent
Each kind of grain	Mixed grain	Nearest whole pecent
Plump	Barley	Range **2/**
Sclerotinia	Soybeans Canola	Nearest tenth percent Nearest hundredth percent
Smut	Barley	Nearest hundredth percent
Stones	Canola	Nearest hundredth percent
Test weight	Corn, Rye, Triticale & Wheat All other grains	Whole & nearest tenth pound & whole & nearest tenth kilogram Whole & half pound, fraction disregarded, & whole & nearest tenth kilogram
All other factors	All grains	Nearest tenth percent

1/ Sunflower seed foreign material is reported as follows: 0.0 to 0.24 as 0.0 percent, 0.25 to 0.74 as 0.5 percent, etc.
2/ Ranges of plump shall be: Below 50 percent, 50 to 55 percent, 56 to 60 percent, 61 to 65 percent, etc.

1.17 EQUIPMENT AND MATERIALS

The equipment and materials for performing the bleach test for determining germ-damaged kernels in sorghum and wheat and for the iodine test for determining waxy corn are as follows:

a. Safety Equipment - Bleach and Iodine Tests.

(1) Full face protection shield.

(2) Impervious plastic or rubber apron and gloves.

(3) Exhaust system.

(4) Eye wash station.

(5) Hand held spray.

b. Equipment and Materials - S/J Mixer Bleach Test. Properly functioning equipment and adherence to established procedures are vital to the successful removal of the sorghum seed coat.

(1) Potassium Hydroxide (KOH) Pellets (85-90%). KOH is a caustic chemical that functions to generate the heat necessary for the bleaching reaction to occur. Due to the hygroscropic nature (readily absorbs water) of this chemical, continued or prolonged exposure to air/moisture significantly reduces its strength. To ensure that the KOH provides satisfactory, repeatable results, it is critical to control the amount and purity of the KOH pellets used in the bleaching process.

(a) Do not use KOH pellets that appear shiny or that clump together. Such conditions indicate that the pellets have absorbed water to the extent that it will significantly reduce the KOH's heat generating capability.

(b) Between samples and at the end of the day make sure the lid is tightly secured to the jar.

(2) Sodium Hypochlorite (Bleach). Bleach serves a dual purpose in the bleaching process. It provides the moisture necessary to generate heat by dissolving the KOH pellets. It also combines with the KOH to chemically remove the seedcoat. To ensure that a satisfactory reaction occurs, control the type, amount, and concentration of bleach used in the process as follows:

(a) Measure exactly 40.0 ml of bleach using a 50-ml or 100-ml graduated cylinder or a dispenser. If dispensers are used, they must meet the following criteria:

- Cylinder capacity: 50 ml

- Accuracy: ± 1.0 percent

- Reproducibility: ± 0.1 percent

When ordering dispensers, make sure the plunger assembly is capable of fitting the type/size of reagent bottle you are using. Examples of dispensers meeting this criteria include the Brinkman dispensette and Repipet dispenser which are available through Fisher Scientific (1-800-766-7000), catalog number 13-688-70 and 13-687-57, respectively.

(b) Use major brands of bleach only (e.g., Clorox, Purex) that contain at least 5.25% active ingredients. Do not use regional or local brands due to the potential variations that exist in the concentration level of the bleach.

(c) To maintain a consistent concentration of bleach (5.25%), record the purchase/expiration (3 months after purchase) date of the bleach on the bottle. Replace any bleach exceeding the expiration date.

(3) Vinegar to neutralize any spilled KOH.

(4) Teaspoon.

(5) Polyethylene coated weighing paper, 3 inches in diameter.

(6) Balance.

(7) 100-ml graduated cylinder.

(8) Timer. Verify the accuracy of the timer setting immediately prior to sorghum harvest and as necessary thereafter to maintain a mixing time of 3 minutes ± 10 seconds.

(9) S/J mixer. Make sure there is no hesitation in the rotation of the stirring blade.

(a) Stir jar and assembly for S/J mixer.

(b) One extra stirring head for each mixer as well as several mixing jars are recommended.

(10) Small tea strainer.

(11) Paper towels.

(12) Drying apparatus (hair dryer modified with sieve to dry bleached kernels).

c. Equipment and materials - Iodine Test. The equipment and materials for determining waxy corn are as follows:

(1) Cutting implement.

(a) Sharp knife; or

(b) Razor blade.

(2) Spray bottle.

(a) Dark-colored, trigger-spray, polyethylene bottle; or

(b) Amber colored borosilicate glass with atomizer bulb.

(3) Petri dish or porcelain plate or other stain-resistant container.

(4) Wax paper, plastic wrap, or plastic sheets to spread on work surfaces.

(5) Iodine stock solution.

CAUTION: Protect containers of iodine (crystals and solutions) from physical damage. Perform all mixing in a well ventilated area or within the working area of a laboratory hood.

Follow steps (a) through (f) to prepare the iodine stock solution.

(a) Weigh out 10 grams of iodine crystals and 20 grams of potassium iodide crystals.

(b) Measure 1,000 ml of distilled water.

(c) Pour the distilled water into an amber-colored bottle.

(d) Dissolve the 20 grams of potassium iodide crystals in the distilled water.

(e) Add the 10 grams of iodine crystals.

(f) Mix thoroughly. Label the bottle "Iodine Stock Solution." Post poison labels on the bottles.

NOTE: Iodine crystals and potassium iodide crystals can be purchased from chemical supply companies or from pharmacies.

1.18 FILE SAMPLE RETENTION (GRAIN)

a. General. To accomplish the mission of the agency, FGIS has established the policy of maintaining an effective record management program. Part of the official record system is the maintenance of file samples retained for reference or review purposes. Reference FGIS Program Directive 9170.13, Uniform File Sample Retention System, for detailed procedures.

b. Use of File Sample. Official personnel shall establish and maintain a file sample retention system in accordance with the regulations and applicable instructions. File samples may be used for:

(1) Monitoring purposes by official personnel;

(2) Supplementary completion of the original grade (e.g., infestation, odor, etc.);

(3) Review by interested persons;

(4) Reinspections, appeals, and Board appeals;

(5) Answering trade complaints; and

(6) Training.

c. Sample Retention. Official personnel may, at their discretion, keep file samples for a period longer than required. The minimum retention periods (calendar days) are as follows:

TABLE NO. 6

FILE SAMPLE RETENTION				
	MINIMUM DAYS			
	IN	OUT	EXPORT	OTHER
Trucks	3	5	30	-
Railcars	5	10	30	-
Barges (River)	5	25	-	-
Ships & Barges (lake or ocean)	5	25	90	-
Bins & Tanks	-	-	-	3
Submitted samples	-	-	-	3

When an agency file sample is used to complete an appeal inspection or selected for monitoring, the monitoring office shall maintain the sample for the applicable retention period.

d. Sample Size. File samples shall be of sufficient size to accommodate subsequent examinations or analysis. Samples retained for grade should be approximately 1,400 grams or more, except for the lighter grains (e.g., oats, sunflower seed, etc.), that require less grain to determine grade. For factor only tests or official criteria (e.g., wheat protein), smaller file samples should prove sufficient to handle review services. File samples larger than 1,400 grams may be retained if deemed necessary to provide subsequent inspection service.

e. Retention of Worked File Samples. If possible, retain an unworked portion of a representative sample or submitted sample as the final file. The worked portion may be retained as the final file only when insufficient sample is available for an unworked file sample.

f. File System. Official personnel must maintain a sample filing system that permits efficient retrieval of file samples and ensures adherence to required retention periods (paragraph c. above). Further, file samples must be protected against theft, manipulation, substitution, and unauthorized use.

Use large polyethylene bags, semi-rigid plastic containers, or metal containers to retain file samples. Use metal or semi-rigid plastic containers when samples contain an off odor.

g. Disposal Procedures. Official personnel must keep complete and accurate disposition records. After file samples have served their intended purpose, dispose of the grain in accordance with criteria outlined in section 800.81(e) of the regulations and applicable instructions as follows:

(1) Upon the applicant's request, return the file samples to the applicant;

(2) If the applicant does not request the return of the grain, it may be sold, donated, or destroyed; and

(3) If the grain contains toxic substances (e.g., treated seed, aflatoxin, etc.), dispose of the grain in accordance with applicable Federal, State, and local laws.

1.19 UNOFFICIAL INSPECTION SERVICES

Occasionally, official personnel receive requests from processors, producers, seed companies, etc., to perform certain analysis on grain or grain related products. While many tests differ from official determinations, some analyses are the same or very similar. The actual testing methodology used is often specified by trading rules or by the specific applicant.

Official personnel who receive requests for such analysis or service, such as seed grain testing, brown test in corn, and yield in oats, may perform the service(s) on an unofficial basis.

1.20 METRIC SYSTEM

The following tables are provided to assist in the conversion from the U.S. measurement system (inch-pound) to the metric system.

TABLE NO. 7

CONVERSIONS

A = C ÷ B			C = A x B	
Symbol	A Inch – Pound Unit	B Factor	Symbol	C Metric Unit
bu	bushels (U.S.)	35.239	hl	hectoliters
gal	gallons (U.S.)	3.785	L	liters
in	inches	25.4	mm	millimeters
lb	pounds	0.4536	kg	kilograms
lb/bu	pounds per bushel	*	kg/hl	kilograms per hectoliter
qt	quarts (dry)	1.101	L	liters
qt	quarts (liquid)	0.946	L	liters
ton	tons (short)	0.907	t	metric tons

* See Table No.1 for conversion factors.

TABLE NO. 8

EQUIVALENTS

				VOLUME			
Weight		Length		Dry		Liquid	
grain	= 0.06 g	1 in	= 2.54 cm = 25.4 mm	1 pt	= 0.28 L	1 pt	= 0.473 L
1 oz	= 28 g	1 ft	= .304 m	1 qt	= 1.10 L	1 qt	= 0.946 L
1 lb	= 0.45 kg	1 yd	= 0.914 m	1 gal	= 35.24 L	1 gal	= 3.785 L
1 bu	= 352.4 hl						
1 st	= 907 kg = 0.9t						
1 lt	= 1016.0 kg = 1.02t						
1 ppb	= 1 µg/kg						
1 ppm	= 1 mg/kg						

TABLE NO. 9

MEASURES						
Pounds Per Bushel (trade weight)		Bushels Per Ton	Short	Metric (t)	Bushels to Metric Tons	
Wheat, Soybeans, Triticale	60	Wheat, Soybeans, Triticale	33.3	36.7	Wheat, Soybeans	= bu. x .027
Corn, Sorghum, Flaxseed, Rye	56	Corn, Sorghum, Flaxseed, Rye	35.7	39.4	Corn, Sorghum, Rye	= bu. x .025
Canola/Rapeseed	50	Canola/Rapeseed	40.0	44.0	Canola, Rapeseed	= bu. x .023
Barley	48	Barley	41.7	45.9	Barley	= bu. x .022
Oats	32	Oats	62.5	68.9	Oats	= bu. x .015
Sunflower Seed	24	Sunflower Seed	83.3	91.9	Sunflower Seed	= bu. x .011

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

275 – 295.5		296 – 316.5		317 – 337.5		338 – 358.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
275	19.4	296	20.9	317	22.4	338	23.8
275.5	19.4	296.5	20.9	317.5	22.4	338.5	23.9
276	19.5	297	21.0	318	22.4	339	23.9
276.5	19.5	297.5	21.0	318.5	22.5	339.5	24.0
277	19.5	298	21.0	319	22.5	340	24.0
277.5	19.6	298.5	21.1	319.5	22.5	340.5	24.0
278	19.6	299	21.1	320	22.6	341	24.1
278.5	19.6	299.5	21.1	320.5	22.6	341.5	24.1
279	19.7	300	21.2	321	22.6	342	24.1
279.5	19.7	300.5	21.2	321.5	22.7	342.5	24.2
280	19.8	301	21.2	322	22.7	343	24.2
280.5	19.8	301.5	21.3	322.5	22.8	343.5	24.2
281	19.8	302	21.3	323	22.8	344	24.3
281.5	19.9	302.5	21.3	323.5	22.8	344.5	24.3
282	19.9	303	21.4	324	22.9	345	24.3
282.5	19.9	303.5	21.4	324.5	22.9	345.5	24.4
283	20.0	304	21.4	325	22.9	346	24.4
283.5	20.0	304.5	21.5	325.5	23.0	346.5	24.4
284	20.0	305	21.5	326	23.0	347	24.5
284.5	20.1	305.5	21.6	326.5	23.0	347.5	24.5
285	20.1	306	21.6	327	23.1	348	24.6
285.5	20.1	306.5	21.6	327.5	23.1	348.5	24.6
286	20.2	307	21.7	328	23.1	349	24.6
286.5	20.2	307.5	21.7	328.5	23.2	349.5	24.7
287	20.2	308	21.7	329	23.2	350	24.7
287.5	20.3	308.5	21.8	329.5	23.2	350.5	24.7
288	20.3	309	21.8	330	23.3	351	24.8
288.5	20.4	309.5	21.8	330.5	23.3	351.5	24.8
289	20.4	310	21.9	331	23.4	352	24.8
289.5	20.4	310.5	21.9	331.5	23.4	352.5	24.9
290	20.5	311	21.9	332	23.4	353	24.9
290.5	20.5	311.5	22.0	332.5	23.5	353.5	24.9
291	20.5	312	22.0	333	23.5	354	25.0
291.5	20.6	312.5	22.0	333.5	23.5	354.5	25.0
292	20.6	313	22.1	334	23.6	355	25.0
292.5	20.6	313.5	22.1	334.5	23.6	355.5	25.1
293	20.7	314	22.2	335	23.6	356	25.1
293.5	20.7	314.5	22.2	335.5	23.7	356.5	25.2
294	20.7	315	22.2	336	23.7	357	25.2
294.5	20.8	315.5	22.3	336.5	23.7	357.5	25.2
295	20.8	316	22.3	337	23.8	358	25.3
295.5	20.8	316.5	22.3	337.5	23.8	358.5	25.3

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

359 – 379.5		380 – 400.5		401 – 421.5		422 – 442.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
359	25.3	380	26.8	401	28.3	422	29.8
359.5	25.4	380.5	26.8	401.5	28.3	422.5	29.8
360	25.4	381	26.9	402	28.4	423	29.8
360.5	25.4	381.5	26.9	402.5	28.4	423.5	29.9
361	25.5	382	26.9	403	28.4	424	29.9
361.5	25.5	382.5	27.0	403.5	28.5	424.5	29.9
362	25.5	383	27.0	404	28.5	425	30.0
362.5	25.6	383.5	27.1	404.5	28.5	425.5	30.0
363	25.6	384	27.1	405	28.6	426	30.1
363.5	25.6	384.5	27.1	405.5	28.6	426.5	30.1
364	25.7	385	27.2	406	28.6	427	30.1
364.5	25.7	385.5	27.2	406.5	28.7	427.8	30.2
365	25.7	386	27.2	407	28.7	428	30.2
365.5	25.8	386.5	27.3	407.5	28.7	428.5	30.2
366	25.8	387	27.3	408	28.8	429	30.3
366.5	25.9	387.5	27.3	408.5	28.8	429.5	30.3
367	25.9	388	27.4	409	28.9	430	30.3
367.5	25.9	388.5	27.4	409.5	28.9	430.5	30.4
368	26.0	389	27.4	410	28.9	431	30.4
368.5	26.0	389.5	27.5	410.5	29.0	431.5	30.4
369	26.0	390	27.5	411	29.0	432	30.5
369.5	26.1	390.5	27.5	411.5	29.0	432.5	30.5
370	26.1	391	27.6	412	29.1	433	30.5
370.5	26.1	391.5	27.6	412.5	29.1	433.5	30.6
371	26.2	392	27.7	413	29.1	434	30.6
371.5	26.2	392.5	27.7	413.5	29.2	434.5	30.7
372	26.2	393	27.7	414	29.2	435	30.7
372.5	26.3	393.5	27.8	414.5	29.2	435.5	30.7
373	26.3	394	27.8	415	29.3	436	30.8
373.5	26.3	394.5	27.8	415.5	29.3	436.5	30.8
374	26.4	395	27.9	416	29.3	437	30.8
374.5	26.4	395.5	27.9	416.5	29.4	437.5	30.9
375	26.5	396	27.9	417	29.4	438	30.9
375.5	26.5	396.5	28.0	417.5	29.5	438.5	30.9
376	26.5	397	28.0	418	29.5	439	31.0
376.5	26.6	397.5	28.0	418.5	29.5	439.5	31.0
377	26.6	398	28.1	419	29.6	440	31.0
377.5	26.6	398.5	28.1	419.5	29.6	440.5	31.1
378	26.7	399	28.1	420	29.6	441	31.1
378.5	26.7	399.5	28.2	420.5	29.7	441.5	31.1
379	26.7	400	28.2	421	29.7	442	31.2
379.5	26.8	400.5	28.3	421.5	29.7	442.5	31.2

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

443 – 463.5		464 – 484.5		485 – 505.5		506 – 526.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
443	31.3	464	32.7	485	34.2	506	35.7
443.5	31.3	464.5	32.8	485.5	34.3	506.5	35.7
444	31.3	465	32.8	486	34.3	507	35.8
444.5	31.4	465.5	32.8	486.5	34.3	507.5	35.8
445	31.4	466	32.9	487	34.4	508	35.8
445.5	31.4	466.5	32.9	487.5	34.4	508.5	35.9
446	31.5	467	32.9	488	34.4	509	35.9
446.5	31.5	467.5	33.0	488.5	34.5	509.5	35.9
447	31.5	468	33.0	489	34.5	510	36.0
447.5	31.6	468.5	33.1	489.5	34.5	510.5	36.0
448	31.6	469	33.1	490	34.6	511	36.0
448.5	31.6	469.5	33.1	490.5	34.6	511.5	36.1
449	31.7	470	33.2	491	34.6	512	36.1
449.5	31.7	470.5	33.2	491.5	34.7	512.5	36.2
450	31.7	471	33.2	492	34.7	513	36.2
450.5	31.8	471.5	33.3	492.5	34.7	513.5	36.2
451	31.8	472	33.3	493	34.8	514	36.3
451.5	31.9	472.5	33.3	493.5	34.8	514.5	36.3
452	31.9	473	33.4	494	34.9	515	36.3
452.5	31.9	473.5	33.4	494.5	34.9	515.5	36.4
453	32.0	474	33.4	495	34.9	516	36.4
453.5	32.0	474.5	33.5	495.5	35.0	516.5	36.4
454	32.0	475	33.5	496	35.0	517	36.5
454.5	32.1	475.5	33.5	496.5	35.0	517.5	36.5
455	32.1	476	33.6	497	35.1	518	36.5
455.5	32.1	476.5	33.6	497.5	35.1	518.5	36.6
456	32.2	477	33.7	498	35.1	519	36.6
456.5	32.2	477.5	33.7	498.5	35.2	519.5	36.6
457	32.2	478	33.7	499	35.2	520	36.7
457.5	32.3	478.5	33.8	499.5	35.2	520.5	36.7
458	32.3	479	33.8	500	35.3	521	36.8
458.5	32.3	479.5	33.8	500.5	35.3	521.5	36.8
459	32.4	480	33.9	501	35.3	522	36.8
459.5	32.4	480.5	33.9	501.5	35.4	522.5	36.9
460	32.5	481	33.9	502	35.4	523	36.9
460.5	32.5	481.5	34.0	502.5	35.5	523.5	36.9
461	32.5	482	34.0	503	35.5	524	37.0
461.5	32.6	482.5	34.0	503.5	35.5	524.5	37.0
462	32.6	483	34.1	504	35.6	525	37.0
462.5	32.6	483.5	34.1	504.5	35.6	525.5	37.1
463	32.7	484	34.1	505	35.6	526	37.1
463.5	32.7	484.5	34.2	505.5	35.7	526.5	37.1

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

527 – 547.5		548 – 568.5		569 – 589.5		590 – 610.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
527	37.2	548	38.7	569	40.1	590	41.6
527.5	37.2	548.5	38.7	569.5	40.2	590.5	41.7
528	37.2	549	38.7	570	40.2	591	41.7
528.5	37.3	549.5	38.8	570.5	40.2	591.5	41.7
529	37.3	550	38.8	571	40.3	592	41.8
529.5	37.4	550.5	38.8	571.5	40.3	592.5	41.8
530	37.4	551	38.9	572	40.4	593	41.8
530.5	37.4	551.5	38.9	572.5	40.4	593.5	41.9
531	37.5	552	38.9	573	40.4	594	41.9
531.5	37.5	552.5	39.0	573.5	40.5	594.5	41.9
532	37.5	553	39.0	574	40.5	595	42.0
532.5	37.6	553.5	39.0	574.5	40.5	595.5	42.0
533	37.6	554	39.1	575	40.6	596	42.0
533.5	37.6	554.5	39.1	575.5	40.6	596.5	42.1
534	37.7	555	39.2	576	40.6	597	42.1
534.5	37.7	555.5	39.2	576.5	40.7	597.5	42.2
535	37.7	556	39.2	577	40.7	598	42.2
535.5	37.8	556.5	39.3	577.5	40.7	598.5	42.2
536	37.8	557	39.3	578	40.8	599	42.3
536.5	37.8	557.5	39.3	578.5	40.8	599.5	42.3
537	37.9	558	39.4	579	40.8	600	42.3
537.5	37.9	558.5	39.4	579.5	40.9	600.5	42.4
538	38.0	559	39.4	580	40.9	601	42.4
538.5	38.0	559.5	39.5	580.5	41.0	601.5	42.4
539	38.0	560	39.5	581	41.0	602	42.5
539.5	38.1	560.5	39.5	581.5	41.0	602.5	42.5
540	38.1	561	39.6	582	41.1	603	42.5
540.5	38.1	561.5	39.6	582.5	41.1	603.5	42.6
541	38.2	562	39.6	583	41.1	604	42.6
541.5	38.2	562.5	39.7	583.5	41.2	604.5	42.6
542	38.2	563	39.7	584	41.2	605	42.7
542.5	38.3	563.5	39.8	584.5	41.2	605.5	42.7
543	38.3	564	39.8	585	41.3	606	42.8
543.5	38.3	564.5	39.8	585.5	41.3	606.5	42.8
544	38.4	565	39.9	586	41.3	607	42.8
544.5	38.4	565.5	39.9	586.5	41.4	607.5	42.9
545	38.4	566	39.9	587	41.4	608	42.9
545.5	38.5	566.5	40.0	587.5	41.4	608.5	42.9
546	38.5	567	40.0	588	41.5	609	43.0
546.5	38.6	567.5	40.0	588.5	41.5	609.5	43.0
547	38.6	568	40.1	589	41.6	610	43.0
547.5	38.6	568.5	40.1	589.5	41.6	610.5	43.1

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

611 – 631.5		632 – 652.5		653 – 673.5		674 – 694.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
611	43.1	632	44.6	653	46.1	674	47.5
611.5	43.1	632.5	44.6	653.5	46.1	674.5	47.6
612	43.2	633	44.7	654	46.1	675	47.6
612.5	43.2	633.5	44.7	654.5	46.2	675.5	47.7
613	43.2	634	44.7	655	46.2	676	47.7
613.5	43.3	634.5	44.8	655.5	46.2	676.5	47.7
614	43.3	635	44.8	656	46.3	677	47.8
614.5	43.4	635.5	44.8	656.5	46.3	677.5	47.8
615	43.4	636	44.9	657	46.3	678	47.8
615.5	43.4	636.5	44.9	657.5	46.4	678.5	47.9
616	43.5	637	44.9	658	46.4	679	47.9
616.5	43.5	637.5	45.0	658.5	46.5	679.5	47.9
617	43.5	638	45.0	659	46.5	680	48.0
617.5	43.6	638.5	45.0	659.5	46.5	680.5	48.0
618	43.6	639	45.1	660	46.6	681	48.0
618.5	43.6	639.5	45.1	660.5	46.6	681.5	48.1
619	43.7	640	45.2	661	46.6	682	48.1
619.5	43.7	640.5	45.2	661.5	46.7	682.5	48.1
620	43.7	641	45.2	662	46.7	683	48.2
620.5	43.8	641.5	45.3	662.5	46.7	683.5	48.2
621	43.8	642	45.3	663	46.8	684	48.3
621.5	43.8	642.5	45.3	663.5	46.8	684.5	48.3
622	43.9	643	45.4	664	46.8	685	48.3
622.5	43.9	643.5	45.4	664.5	46.9	685.5	48.4
623	44.0	644	45.4	665	46.9	686	48.4
623.5	44.0	644.5	45.5	665.5	46.9	686.5	48.4
624	44.0	645	45.5	666	47.0	687	48.5
624.5	44.1	645.5	45.5	666.5	47.0	687.5	48.5
625	44.1	646	45.6	667	47.1	688	48.5
625.5	44.1	646.5	45.6	667.5	47.1	688.5	48.6
626	44.2	647	45.6	668	47.1	689	48.6
626.5	44.2	647.5	45.7	668.5	47.2	689.5	48.6
627	44.2	648	45.7	669	47.2	690	48.7
627.5	44.3	648.5	45.8	669.5	47.2	690.5	48.7
628	44.3	649	45.8	670	47.3	691	48.7
628.5	44.3	649.5	45.8	670.5	47.3	691.5	48.8
629	44.4	650	45.9	671	47.3	692	48.8
629.5	44.4	650.5	45.9	671.5	47.4	692.5	48.9
630	44.4	651	45.9	672	47.4	693	48.9
630.5	44.5	651.5	46.0	672.5	47.4	693.5	48.9
631	44.5	652	46.0	673	47.5	694	49.0
631.5	44.6	652.5	46.0	673.5	47.5	694.5	49.0

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

695 –715.5		716 – 736.5		737 – 757.5		758 – 778.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
695	49.0	716	50.5	737	52.0	758	53.5
695.5	49.1	716.5	50.5	737.5	52.0	758.5	53.5
696	49.1	717	50.6	738	52.1	759	53.5
696.5	49.1	717.5	50.6	738.5	52.1	759.5	53.6
697	49.2	718	50.7	739	52.1	760	53.6
697.5	49.2	718.5	50.7	739.5	52.2	760.5	53.7
698	49.2	719	50.7	740	52.2	761	53.7
698.5	49.3	719.5	50.8	740.5	52.2	761.5	53.7
699	49.3	720	50.8	741	52.3	762	53.8
699.5	49.3	720.5	50.8	741.5	52.3	762.5	53.8
700	49.4	721	50.9	742	52.3	763	53.8
700.5	49.4	721.5	50.9	742.5	52.4	763.5	53.9
701	49.5	722	50.9	743	52.4	764	53.9
701.5	49.5	722.5	51.0	743.5	52.5	764.5	53.9
702	49.5	723	51.0	744	52.5	765	54.0
702.5	49.6	723.5	51.0	744.5	52.5	765.5	54.0
703	49.6	724	51.1	745	52.6	766	54.0
703.5	49.6	724.5	51.1	745.5	52.6	766.5	54.1
704	49.7	725	51.1	746	52.6	767	54.1
704.5	49.7	725.5	51.2	746.5	52.7	767.5	54.1
705	49.7	726	51.2	747	52.7	768	54.2
705.5	49.8	726.5	51.3	747.5	52.7	768.5	54.2
706	49.8	727	51.3	748	52.8	769	54.3
706.5	49.8	727.5	51.3	748.5	52.8	769.5	54.3
707	49.9	728	51.4	749	52.8	770	54.3
707.5	49.9	728.5	51.4	749.5	52.9	770.5	54.4
708	49.9	729	51.4	750	52.9	771	54.4
708.5	50.0	729.5	51.5	750.5	52.9	771.5	54.4
709	50.0	730	51.5	751	53.0	772	54.5
709.5	50.1	730.5	51.5	751.5	53.0	772.5	54.5
710	50.1	731	51.6	752	53.1	773	54.5
710.5	50.1	731.5	51.6	752.5	53.1	773.5	54.6
711	50.2	732	51.6	753	53.1	774	54.6
711.5	50.2	732.5	51.7	753.5	53.2	774.5	54.6
712	50.2	733	51.7	754	53.2	775	54.7
712.5	50.3	733.5	51.7	754.5	53.2	775.5	54.7
713	50.3	734	51.8	755	53.3	776	54.7
713.5	50.3	734.5	51.8	755.5	53.3	776.5	54.8
714	50.4	735	51.9	756	53.3	777	54.8
714.5	50.4	735.5	51.9	756.5	53.4	777.5	54.9
715	50.4	736	51.9	757	53.4	778	54.9
715.5	50.5	736.5	52.0	757.5	53.4	778.5	54.9

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

779 –799.5		800 – 820.5		821 – 841.5		842 – 862.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
779	55.0	800	56.4	821	57.9	842	59.4
779.5	55.0	800.5	56.5	821.5	58.0	842.5	59.4
780	55.0	801	56.5	822	58.0	843	59.5
780.5	55.1	801.5	56.5	822.5	58.0	843.5	59.5
781	55.1	802	56.6	823	58.1	844	59.5
781.5	55.1	802.5	56.6	823.5	58.1	844.5	59.6
782	55.2	803	56.6	824	58.1	845	59.6
782.5	55.2	803.5	56.7	824.5	58.2	845.5	59.6
783	55.2	804	56.7	825	58.2	846	59.7
783.5	55.3	804.5	56.8	825.5	58.2	846.5	59.7
784	55.3	805	56.8	826	58.3	847	59.8
784.5	55.3	805.5	56.8	826.5	58.3	847.5	59.8
785	55.4	806	56.9	827	58.3	848	59.8
785.5	55.4	806.5	56.9	827.5	58.4	848.5	59.9
786	55.5	807	56.9	828	58.4	849	59.9
786.5	55.5	807.5	57.0	828.5	58.4	849.5	59.9
787	55.5	808	57.0	829	58.5	850	60.0
787.5	55.6	808.5	57.0	829.5	58.5	850.5	60.0
788	55.6	809	57.1	830	58.6	851	60.0
788.5	55.6	809.5	57.1	830.5	58.6	851.5	60.1
789	55.7	810	57.1	831	58.6	852	60.1
789.5	55.7	810.5	57.2	831.5	58.7	852.5	60.1
790	55.7	811	57.2	832	58.7	853	60.2
790.5	55.8	811.5	57.2	832.5	58.7	853.5	60.2
791	55.8	812	57.3	833	58.8	854	60.2
791.5	55.8	812.5	57.3	833.5	58.8	854.5	60.3
792	55.9	813	57.4	834	58.8	855	60.3
792.5	55.9	813.5	57.4	834.5	58.9	855.5	60.4
793	55.9	814	57.4	835	58.9	856	60.4
793.5	56.0	814.5	57.5	835.5	58.9	856.5	60.4
794	56.0	815	57.5	836	59.0	857	60.5
794.5	56.1	815.5	57.5	836.5	59.0	857.5	60.5
795	56.1	816	57.6	837	59.0	858	60.5
795.5	56.1	816.5	57.6	837.5	59.1	858.5	60.6
796	56.2	817	57.6	838	59.1	859	60.6
796.5	56.2	817.5	57.7	838.5	59.2	859.5	60.6
797	56.2	818	57.7	839	59.2	860	60.7
797.5	56.3	818.5	57.7	839.5	59.2	860.5	60.7
798	56.3	819	57.8	840	59.3	861	60.7
798.5	56.3	819.5	57.8	840.5	59.3	861.5	60.8
799	56.4	820	57.8	841	59.3	862	60.8
799.5	56.4	820.5	57.9	841.5	59.4	862.5	60.8

TEST WEIGHT CONVERSION CHART

GRAMS TO TEST WEIGHT PER BUSHEL (LB/BU)

863 – 880.5		881 - 898.5		899 – 916.5		917 – 934.5	
Grams	lb/bu	Grams	lb/bu	Grams	lb/bu	Grams	lb/bu
863	60.9	881	62.2	899	63.4	917	64.7
863.5	60.9	881.5	62.2	899.5	63.5	917.5	64.7
864	61.0	882	62.2	900	63.5	918	64.8
864.5	61.0	882.5	62.3	900.5	63.5	918.5	64.8
865	61.0	883	62.3	901	63.6	919	64.8
865.5	61.1	883.5	62.3	901.5	63.6	919.5	64.9
866	61.1	884	62.4	902	63.6	920	64.9
866.5	61.1	884.5	62.4	902.5	63.7	920.5	64.9
867	61.2	885	62.4	903	63.7	921	65.0
867.5	61.2	885.5	62.5	903.5	63.7	921.5	65.0
868	61.2	886	62.5	904	63.8	922	65.0
868.5	61.3	886.5	62.5	904.5	63.8	922.5	65.1
869	61.3	887	62.6	905	63.8	923	65.1
869.5	61.3	887.5	62.6	905.5	63.9	923.5	65.2
870	61.4	888	62.6	906	63.9	924	65.2
870.5	61.4	888.5	62.7	906.5	64.0	924.5	65.2
871	61.4	889	62.7	907	64.0	925	65.3
871.5	61.5	889.5	62.8	907.5	64.0	925.5	65.3
872	61.5	890	62.8	908	64.1	926	65.3
872.5	61.6	890.5	62.8	908.5	64.1	926.5	65.4
873	61.6	891	62.9	909	64.1	927	65.4
873.5	61.6	891.5	62.9	909.5	64.2	927.5	65.4
874	61.7	892	62.9	910	64.2	928	65.5
874.5	61.7	892.5	63.0	910.5	64.2	928.5	65.5
875	61.7	893	63.0	911	64.3	929	65.5
875.5	61.8	893.5	63.0	911.5	64.3	929.5	65.6
876	61.8	894	63.1	912	64.3	930	65.6
876.5	61.8	894.5	63.1	912.5	64.4	930.5	65.6
877	61.9	895	63.1	913	64.4	931	65.7
877.5	61.9	895.5	63.2	913.5	64.4	931.5	65.7
878	61.9	896	63.2	914	64.5	932	65.8
878.5	62.0	896.5	63.2	914.5	64.5	932.5	65.8
879	62.0	897	63.3	915	64.6	933	65.8
879.5	62.0	897.5	63.3	915.5	64.6	933.5	65.9
880	62.1	898	63.4	916	64.6	934	65.9
880.5	62.1	898.5	63.4	916.5	64.7	934.5	65.9

TEST WEIGHT/KILOGRAMS PER HECTOLITER CONVERSION CHART - WHEAT

lb/bu	kg/hl Durum Wheat	kg/hl Other Wheat	lb/bu	kg/hl Durum Wheat	kg/hl Other Wheat	lb/bu	kg/hl Durum Wheat	kg/hl Other Wheat
50.0	65.2	66.0	54.4	70.9	71.7	58.8	76.6	77.4
50.1	65.4	66.1	54.5	71.0	71.8	58.9	76.7	77.5
50.2	65.5	66.3	54.6	71.2	72.0	59.0	76.9	77.6
50.3	65.6	66.4	54.7	71.3	72.1	59.1	77.0	77.8
50.4	65.7	66.5	54.8	71.4	72.2	59.2	77.1	77.9
50.5	65.9	66.7	54.9	71.6	72.3	59.3	77.2	78.0
50.6	66.0	66.8	55.0	71.7	72.5	59.4	77.4	78.2
50.7	66.1	66.9	55.1	71.8	72.6	59.5	77.5	78.3
50.8	66.3	67.1	55.2	71.9	72.7	59.6	77.6	78.4
50.9	66.4	67.2	55.3	72.1	72.9	59.7	77.8	78.6
51.0	66.5	67.3	55.4	72.2	73.0	59.8	77.9	78.7
51.1	66.7	67.4	55.5	72.3	73.1	59.9	78.0	78.8
51.2	66.8	67.6	55.6	72.5	73.3	60.0	78.2	78.9
51.3	66.9	67.7	55.7	72.6	73.4	60.1	78.3	79.1
51.4	67.0	67.8	55.8	72.7	73.5	60.2	78.4	79.2
51.5	67.2	68.0	55.9	72.9	73.6	60.3	78.5	79.3
51.6	67.3	68.1	56.0	73.0	73.8	60.4	78.7	79.5
51.7	67.4	68.2	56.1	73.1	73.9	60.5	78.8	79.6
51.8	67.6	68.3	56.2	73.2	74.0	60.6	78.9	79.7
51.9	67.7	68.5	56.3	73.4	74.2	60.7	79.1	79.8
52.0	67.8	68.6	56.4	73.5	74.3	60.8	79.2	80.0
52.1	67.9	68.7	56.5	73.6	74.4	60.9	79.3	80.1
52.2	68.1	68.9	56.6	73.8	74.5	61.0	79.4	80.2
52.3	68.2	69.0	56.7	73.9	74.7	61.1	79.6	80.4
52.4	68.3	69.1	56.8	74.0	74.8	61.2	79.7	80.5
52.5	68.5	69.2	56.9	74.1	74.9	61.3	79.8	80.6
52.6	68.6	69.4	57.0	74.3	75.1	61.4	80.0	80.7
52.7	68.7	69.5	57.1	74.4	75.2	61.5	80.1	80.9
52.8	68.8	69.6	57.2	74.5	75.3	61.6	80.2	81.0
52.9	69.0	69.8	57.3	74.7	75.5	61.7	80.3	81.1
53.0	69.1	69.9	57.4	74.8	75.6	61.8	80.5	81.3
53.1	69.2	70.0	57.5	74.9	75.7	61.9	80.6	81.4
53.2	69.4	70.2	57.6	75.0	75.8	62.0	80.7	81.5
53.3	69.5	70.3	57.7	75.2	76.0	62.1	80.9	81.7
53.4	69.6	70.4	57.8	75.3	76.1	62.2	81.0	81.8
53.5	69.8	70.5	57.9	75.4	76.2	62.3	81.1	81.9
53.6	69.9	70.7	58.0	75.6	76.4	62.4	81.3	82.0
53.7	70.0	70.8	58.1	75.7	76.5	62.5	81.4	82.2
53.8	70.1	70.9	58.2	75.8	76.6	62.6	81.5	82.3
53.9	70.3	71.1	58.3	76.0	76.7	62.7	81.6	82.4
54.0	70.4	71.2	58.4	76.1	76.9	62.8	81.8	82.6
54.1	70.5	71.3	58.5	76.2	77.0	62.9	81.9	82.7
54.2	70.7	71.4	58.6	76.3	77.1	63.0	82.0	82.8
54.3	70.8	71.6	58.7	76.5	77.3	63.1	82.2	82.9

TEST WEIGHT/KILOGRAMS PER HECTOLITER CONVERSION CHART OTHER GRAINS

lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl
23.0	29.6	27.4	35.3	31.8	40.9	36.2	46.6	40.6	52.3	45.0	57.9
23.1	29.7	27.5	35.4	31.9	41.1	36.3	46.7	40.7	52.4	45.1	58.0
23.2	29.9	27.6	35.5	32.0	41.2	36.4	46.8	40.8	52.5	45.2	58.2
23.3	30.0	27.7	35.6	32.1	41.3	36.5	47.0	40.9	52.6	45.3	58.3
23.4	30.1	27.8	35.8	32.2	41.4	36.6	47.1	41.0	52.8	45.4	58.4
23.5	30.2	27.9	35.9	32.3	41.6	36.7	47.2	41.1	52.9	45.5	58.6
23.6	30.4	28.0	36.0	32.4	41.7	36.8	47.4	41.2	53.0	45.6	58.7
23.7	30.5	28.1	36.2	32.5	41.8	36.9	47.5	41.3	53.2	45.7	58.8
23.8	30.6	28.2	36.3	32.6	42.0	37.0	47.6	41.4	53.3	45.8	58.9
23.9	30.8	28.3	36.4	32.7	42.1	37.1	47.7	41.5	53.4	45.9	59.1
24.0	30.9	28.4	36.6	32.8	42.2	37.2	47.9	41.6	53.5	46.0	59.2
24.1	31.0	28.5	36.7	32.9	42.3	37.3	48.0	41.7	53.7	46.1	59.3
24.2	31.1	28.6	36.8	33.0	42.5	37.4	48.1	41.8	53.8	46.2	59.5
24.3	31.3	28.7	36.9	33.1	42.6	37.5	48.3	41.9	53.9	46.3	59.6
24.4	31.4	28.8	37.1	33.2	42.7	37.6	48.4	42.0	54.1	46.4	59.7
24.5	31.5	28.9	37.2	33.3	42.9	37.7	48.5	42.1	54.2	46.5	59.8
24.6	31.7	29.0	37.3	33.4	43.0	37.8	48.6	42.2	54.3	46.6	60.0
24.7	31.8	29.1	37.5	33.5	43.1	37.9	48.8	42.3	54.4	46.7	60.1
24.8	31.9	29.2	37.6	33.6	43.2	38.0	48.9	42.4	54.6	46.8	60.2
24.9	32.0	29.3	37.7	33.7	43.4	38.1	49.0	42.5	54.7	46.9	60.4
25.0	32.2	29.4	37.8	33.8	43.5	38.2	49.2	42.6	54.8	47.0	60.5
25.1	32.3	29.5	38.0	33.9	43.6	38.3	49.3	42.7	55.0	47.1	60.6
25.2	32.4	29.6	38.1	34.0	43.8	38.4	49.4	42.8	55.1	47.2	60.7
25.3	32.6	29.7	38.2	34.1	43.9	38.5	49.5	42.9	55.2	47.3	60.9
25.4	32.7	29.8	38.4	34.2	44.0	38.6	49.7	43.0	55.3	47.4	61.0
25.5	32.8	29.9	38.5	34.3	44.1	38.7	49.8	43.1	55.5	47.5	61.1
25.6	32.9	30.0	38.6	34.4	44.3	38.8	49.9	43.2	55.6	47.6	61.3
25.7	33.1	30.1	38.7	34.5	44.4	38.9	50.1	43.3	55.7	47.7	61.4
25.8	33.2	30.2	38.9	34.6	44.5	39.0	50.2	43.4	55.9	47.8	61.5
25.9	33.3	30.3	39.0	34.7	44.7	39.1	50.3	43.5	56.0	47.9	61.6
26.0	33.5	30.4	39.1	34.8	44.8	39.2	50.5	43.6	56.1	48.0	61.8
26.1	33.6	30.5	39.3	34.9	44.9	39.3	50.6	43.7	56.2	48.1	61.9
26.2	33.7	30.6	39.4	35.0	45.0	39.4	50.7	43.8	56.4	48.2	62.0
26.3	33.8	30.7	39.5	35.1	45.2	39.5	50.8	43.9	56.5	48.3	62.2
26.4	34.0	30.8	39.6	35.2	45.3	39.6	51.0	44.0	56.6	48.4	62.3
26.5	34.1	30.9	39.8	35.3	45.4	39.7	51.1	44.1	56.8	48.5	62.4
26.6	34.2	31.0	39.9	35.4	45.6	39.8	51.2	44.2	56.9	48.6	62.5
26.7	34.4	31.1	40.0	35.5	45.7	39.9	51.4	44.3	57.0	48.7	62.7
26.8	34.5	31.2	40.2	35.6	45.8	40.0	51.5	44.4	57.1	48.8	62.8
26.9	34.6	31.3	40.3	35.7	45.9	40.1	51.6	44.5	57.3	48.9	62.9
27.0	34.7	31.4	40.4	35.8	46.1	40.2	51.7	44.6	57.4	49.0	63.1
27.1	34.9	31.5	40.5	35.9	46.2	40.3	51.9	44.7	57.5	49.1	63.2
27.2	35.0	31.6	40.7	36.0	46.3	40.4	52.0	44.8	57.7	49.2	63.3
27.3	35.1	31.7	40.8	36.1	46.5	40.5	52.1	44.9	57.8	49.3	63.4

TEST WEIGHT/KILOGRAMS PER HECTOLITER CONVERSION CHART OTHER GRAINS

lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl	lb/bu	kg/hl
49.4	63.6	51.2	65.9	53.0	68.2	54.8	70.5	56.6	72.8	58.4	75.2
49.5	63.7	51.3	66.0	53.1	68.3	54.9	70.7	56.7	73.0	58.5	75.3
49.6	63.8	51.4	66.2	53.2	68.5	55.0	70.8	56.8	73.1	58.6	75.4
49.7	64.0	51.5	66.3	53.3	68.6	55.1	70.9	56.9	73.2	58.7	75.5
49.8	64.1	51.6	66.4	53.4	68.7	55.2	71.0	57.0	73.4	58.8	75.7
49.9	64.2	51.7	66.5	53.5	68.9	55.3	71.2	57.1	73.5	58.9	75.8
50.0	64.4	51.8	66.7	53.6	69.0	55.4	71.3	57.2	73.6	59.0	75.9
50.1	64.5	51.9	66.8	53.7	69.1	55.5	71.4	57.3	73.7	59.1	76.1
50.2	64.6	52.0	66.9	53.8	69.2	55.6	71.6	57.4	73.9	59.2	76.2
50.3	64.7	52.1	67.1	53.9	69.4	55.7	71.7	57.5	74.0	59.3	76.3
50.4	64.9	52.2	67.2	54.0	69.5	55.8	71.8	57.6	74.1	59.4	76.4
50.5	65.0	52.3	67.3	54.1	69.6	55.9	71.9	57.7	74.3	59.5	76.6
50.6	65.1	52.4	67.4	54.2	69.8	56.0	72.1	57.8	74.4	59.6	76.7
50.7	65.3	52.5	67.6	54.3	69.9	56.1	72.2	57.9	74.5	59.7	76.8
50.8	65.4	52.6	67.7	54.4	70.0	56.2	72.3	58.0	74.6	59.8	77.0
50.9	65.5	52.7	67.8	54.5	70.1	56.3	72.5	58.1	74.8	59.9	77.1
51.0	65.6	52.8	68.0	54.6	70.3	56.4	72.6	58.2	74.9	60.0	77.2
51.1	65.8	52.9	68.1	54.7	70.4	56.5	72.7	58.3	75.0		